

# Fibre to fibre

## Quality of fabric



Rijkswaterstaat  
Ministry of Infrastructure and the  
Environment



From 2016 until 2019 nine fibre to fibre pilots have been implemented by the European Clothing Action Plan - ECAP. The fibre to fibre pilots were aiming to support the use of recycled post-consumer textile fibres.

Three workwear companies, a linen supplier and five fashion companies were involved in the ECAP pilots. They individually trialed the use of fibres from post-consumer textiles in new garments and shared the learnings from their experiences in case studies and factsheets.

### Key findings

- The materials in post-consumer textiles and the extent of their previous usage determine the usability for recycling
- Since the recycled fibres of cotton originated garments are shorter, they can be mixed with industrial waste to reach a stronger yarn and a high percentage of recycled content
- Blending cotton with polyester or other more sustainable synthetic fibre (f.e tencel, modal) is often an effective solution to strengthen the yarn and fabric
- Polyester can be recycled but does pose the issue of possibly adding microfibres to the plastic soup
- Finding the best qualitative blend of recycled, virgin and polyester fibres is an experiment that takes more production time since the yarn needs to be spun and woven at lower speed
- Trustworthy partnerships with clear agreements prevent issues about who is responsible for the quality are key.

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## Quality of yarn and fabric

Finding the right composition of yarn or fabric with recycled content was a challenge for all pilot companies. For the different types of products other compositions of yarn or fabric were needed. The endless testing of fabrics takes a lot of time. Almost all pilots used mechanical recycling to produce recycled fibres. The disadvantage of this recycling method is that it decreases the quality of the fibre. To compensate this loss of strength and quality, virgin fibres and often stronger fibres like polyester need to be added to the yarn. Therefore, yarn and fabrics often also contain new fibres like virgin cotton or polyester. To increase the percentage of recycled content some companies use industrial pre-consumer waste and recycled polyester from bottles.

Industry-wide collaboration efforts in this space would prove to be useful

## Usability of post-consumer textiles

A few companies started experimenting with used discarded towels. The towels were easy to unravel. Although, in most cases, the fibres were not reusable because of extensive washing in their previous life. Other materials were discarded bed linen and garments. The workwear companies and one fashion company have a take back system in place for their own products to process them into recycled fibres. Denims have proven to be very suitable for recycling. They are already mechanically recycled on a larger scale by various brands and suppliers. Several pilot companies also used pre-consumer material, i.e. the industrial cutting waste. This has a positive effect on the quality of the yarn and the % of recycled fibre as the environmental impact and pricing.

## Recycled fibre strength

In every case it was challenging to compose a strong fabric, either when post-consumer content was used or when industrial recycled content was used. A mechanically recycled fibre is always shorter than a new one, which influences the strength. A solution for preserving the fibre length is currently being developed in the form of wet mechanical recycling, but this solution is not available yet. For now, combining the recycled cotton fibre with recycled PET or with virgin fibres like virgin cotton, Tencel® or viscose makes a qualitative good yarn. The thickness of the yarn has also proven to be an important variable. In one case, the desired thin yarn containing recycled content was too weak and the yarn kept breaking in the weaving loom.

## Strengthening the fabric

The strength of the fabric is tested post-production. For linen, the professional washing is intense. The process includes speed, high temperatures and the use of soap which are all harmful processes for the textiles influencing the strengths of the fabric. The testing on pilling and tensile strength are most critical. For cotton the pilling values for recycled material are lower than for virgin material. This could be solved by a chemical finish layer, however this is not a sustainable solution. One of the pilot companies acknowledged the fact that sometimes they simply have to be honest about offering a slightly lower quality. Using polyester in the fabrics has in all cases proven to be the most successful way to strengthen the product and to reduce pilling.

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## Warranty and responsibility

Any impact to the overall quality of the products is a matter for consideration. Who carries the responsibility in case of quality loss? And which warranties can be given in the case of recycled textiles?

This is a sensitive issue because producing circular textiles is new to all parties in the chain. Therefore, it is important to build trustworthy partnerships and make clear agreements.

Some pilot companies produced 100% recycled fabric by using recycled fibres from PET bottles.

## Microfibres

The extensive use of polyester raises the issue about its contribution to the plastic soup. There has been recent media reports on the loss of microfibers into water while washing. The issue was raised in some pilot companies as well. It seems that the loss of microfibers can be prevented by the structure of the fabric. Soft shell fabrics like fleece lose microfibers while washing, but with twisted yarns this seems to be less evident. Possibly using sustainable viscose instead of polyester could be a better optional solution. However, these materials should then be biodegradable and live up to minimum quality requirements. More expertise is required in this field. This will also help decide if we need to focus on recycling of polyester all together.

## Best practice: Blycolin

Blycolin has already implemented several pilots to find circular best practice for the last 10 years. The linen supplier delivers their service through a pay-per-use construction in contracts lasting around 5 years. The longer the high-quality linen sustains, the stronger their business case. Therefore, quality of the linen is not only crucial for customer satisfaction, but also for economic reasons. Blycolin determines the quality of the textile by the number of times the linen can be washed and by the tensile strength. The yarn, which now consists of 15% post-consumer cotton and 35% industrial cotton waste, was strengthened by adding more polyester and by more extensive twisting of the yarn.

[www.blycolin.com](http://www.blycolin.com)



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The European Clothing Action Plan - ECAP is €3.6 million EU LIFE part funded project. ECAP contributes to creating a more circular approach to reduce clothing waste and water and energy use during production.

### ECAP mission

Cutting the environmental impact of clothing across the supply chain. Generating value for business through collaboration, measuring and sharing best practice.

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The fact sheets were generated as a result of pilots carried out for ECAP by Rijkswaterstaat and the named organisations from 2016 to 2019.

ASOS



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